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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/685,219	10/14/2003	Yaw S. Obeng	SILO-0016	4073

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EXAMINER

UMEZ ERONINI, LYNETTE T

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 06/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/685,219

Applicant(s)

OBENG, YAW S.

Examiner

Lynette T. Umez-Eronini

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 October 2003 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

This communication is in response to Applicant's Remarks (pages 5-6) in Amendment filed 3/16/2006, which were persuasive in showing the combination of Sinha et al. (US **6,551,935**) and Prigge et al. (US 4,968,381) fail to teach a slurry wherein said abrasive particle stabilizer comprises molecules that are equivalent to repeating units of polymer comprising abrasive particles in said slurry. Hence, a new Office Action is presented.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, 5, and 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sinha et al. (US 6,551,935 B1) in view of Deckert et al. (US 3,874,129).

As to claims 1-3, 5 and 8-11, Sinha discloses a slurry for polishing a copper conductive structure of semiconductor device (Abstract). The slurry comprises at least one oxidizer, inhibitor and one or more abrasives (column 3, lines 11-13). Examples of the oxidizer includes hydrogen, ammonium persulfate, potassium iodate (KIO₃), . . . and

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mixtures thereof (column 5, lines 34-40); corrosion inhibitors include benzotriazole (BTA), potassium silicate, and mixtures thereof and make up 0.05 % to 2 % by weight of the slurry (column 5, lines 52-66); and abrasive agents include alumina and silicon dioxide (SiO_2 , same as silica), (column 6, lines 1-3). The slurry can have a pH in the range of 3 to 7 and includes one or more pH control agents or buffers to adjust the pH to a desired level (column 6, lines 6-10). Sinha further teaches a conventional polishing pad or any other pad polishing pad format known in the art that is brought into contact with a copper layer and slurry to remove copper (column 4, lines 27-38). The aforementioned reads on,

A slurry for chemical mechanical polishing (CMP) a metal surface of a semiconductor substrate with a polyurethane free thermoplastic foam polishing body, comprising, an acid buffer that maintains said slurry at a pH between about 2.5 and about 4.0 during polishing of a metal surface on a semiconductor substrate, **in claim 1**; and encompasses,

wherein said pH is between about 2.7 and about 3. 2, **in claim 2**; and

wherein said pH is between about 3.5 and about 4.0, **in claim 3**;

Since Sinha's polishing slurry comprises potassium iodate (same as Applicant's oxidant), then contacting potassium iodate with a metal (Cu) surface that is to be polished, would result the same in the production of a passivation agent, I_2 (column 5, lines 34-40), thereby reading on,

the slurry including an oxidant and a passivation agent, **in claim 8**;

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wherein said passivation agent is generated in situ from a reaction between said metal surface and said oxidant, **in claim 9**; and

wherein said oxidant is potassium iodate (KIO_3) said passivation agent is iodine (I_2) and said metal surface includes copper, **in claim 10**.

Since Sinha's polishing slurry comprises an oxidizer such as potassium iodate and further includes an inhibitor (copper corrosion inhibitors) component such as BTA, (same as Applicant's second passivation agent), (column 5, lines 6-23 and 52-67), then using Sinha's slurry in the same manner as claimed by Applicant would result the same wherein a second passivation agent that is not generated in situ wherein said passivation agent and said second passivation agent synergistically interact with said metal surface to retard corrosion of said metal surface, **in claim 11**.

Sinha differs in failing to teach an abrasive particle stabilizer, wherein said abrasive particle stabilizer comprises molecules that are equivalent to repeating units of polymers comprising abrasive particles in said slurry, **in claim 1**; and

wherein said abrasive particles comprise colloidal silica particles and said abrasive particle stabilizer comprises silicic acid and silicic salt, **in claim 5**.

Deckert discloses, polishing agents containing quartz (same as silica or silicon dioxide), silicic acid, silicates and fluosilicates (same as silicic salt), for chemical polishing in order to obtain smooth surfaces for semiconductors (column 1, lines 4-12). Since the combination of Deckert's silicic acid and silicates is the same as Applicant's stabilizer, then using the said combination in the same manner as claimed by Applicant

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would result the same wherein said abrasive particle stabilizer comprises molecules that are equivalent to repeating units of polymers comprising abrasive particles in the said slurry.

Hence, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Sinha's polishing agent by employing silicic and silicates, (same as Applicant's stabilizer) as taught by Deckert for the purpose of smoothing surfaces of semiconductors that are to be used as components or starting materials for the production of electronic parts, e.g., integrated circuits (Deckert, column 1, lines 9-12).

3. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sinha (US '935 B1) in view of Deckert (US '129) as applied to claim 1 above, and further in view of Prigge et al. (US 4,968,381).

Sinha in view of Deckert differs in failing to teach wherein a ratio of said silicic acid to said silicic salt is between about 100:1 and 1:100, **in claim 6**.

Prigge discloses a polishing solution that contains an additional polishing component containing 1 to 20% by volume of silicic acid or silicates (column 2, lines 5-11) and 1% by volume. The addition of silicic acid to a polishing solution resulted in haze-free polishing of a semiconductor wafer (column 6, lines 23-26).

Since Prigge illustrates a polishing slurry that comprises silica or a silicate salt is known, then, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Sinha in view of Deckert by selecting any

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proportion of (% by volume) of silicic acid or silicates in the Prigge reference, including Applicant's specifically claimed ratio of silicic acid and silicic salt that would effectively accomplish the disclosed composition for the purpose of obtaining a haze-free wafer (see Prigge, column 6, lines 23-26).

4. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sinha in (US '117 B1) in view of Deckert (US '129) as applied to claim 1 above, and further in view of Sato (US 5,906,949).

Sinha in view of Deckert differ in failing to teach wherein said abrasive particle stabilizer comprises aluminate salts.

Sato discloses adding sodium aluminate (same as applicant's aluminate salt) to a slurry containing abrasive particles made of boehmite (same as applicant's alumina).

Since Sato illustrates the combination of abrasive particles comprising alumina and aluminate salt is known, then it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the slurries of Sinha in view of Deckert with a slurry comprising an aluminate salt as taught by Sato for the purpose of improving of the polishing rate without degradation in planarity of the processed surface and in the level of metal impurities (Sato, Abstract).

Response to Arguments

5. Applicant's arguments, see Remarks, filed 3/16/2006, with respect to the rejection(s) of claim(s) 1-11 under 35 U.S.C. 103(a) have been fully considered and are

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persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of:

Sinha et al. (US 6,551,935 B1) in view of Deckert et al. (US 3,874,129), over claims 1-3, 5, and 8-11;

Sinha (US '935 B1) in view of Deckert et al. (US '129) and Prigge et al. (US 4,968,381), over claim 6; and

Sinha (US '935 B1) in view of Deckert (US '129) and Sato (US 5,906,949) over claim 7.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 571-272-1470. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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May 26, 2006


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